

REMARKS

Claims 1-45 are presently pending. The title and claim 41 have been amended.

Reconsideration of the present application, as amended, is respectfully requested.

The Office Action suggested an alternative title. This alternative has been adopted by amendment. Also, during review of the claims, it was noted that antecedent basis for the term "first signal" in the last line of claim 41 could be improved. Accordingly, claim 41 has been amended. It is intended that this change be for clarification purposes only, and that this amendment not be construed to alter the substance of the patent coverage offered by the claim as originally worded, including any equivalents thereto.

Claims 1-11, 13-17, 26-28, 31-34, and 41 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,602,962 to Kellermann et al. (Kellermann) in view of U.S. Patent No. 4,802,227 to Elko et al. (Elko). The Applicants respectfully traverse. "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." Manual of Patent Examining Procedure (MPEP) §2142 (*citing In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Among the features of independent claim 1 are localizing the interfering sources from the first and second signals to provide a corresponding number of interfering source signals that each correspond to a different one of the interfering sources. Furthermore, the first and second signals are each representative of a composite acoustic signal including the desired signal and the unwanted signal. In other words, each interfering signal is source-specific -- each corresponding to a different one of the interfering sources as provided by localization from the composite first and second signals. One nonlimiting embodiment upon which such features read include outputs of the operation array 352 described in connection with Figs. 10-13 of the present application.

Kellermann lacks any operators or other processing to generate interfering source signals as defined in claim 1. In fact, the outputs of preprocessor unit 2 and multipliers 3 of Kellermann only provide composite signals for summation and presentation to a filter, not interfering source-specific signals. "This device produces a sum signal $x=s+n$ from the output signals of the multipliers 3, which sum signal is applied to an adaptive filter 6--for example, a FIR filter arranged as a Wiener filter." Kellerman, col. 3, lines 37-41. In fact, Keller is directed to minimizing noise in its selection of weighting factors. Kellerman, col. 3, lines 45-67. The description associated with Kellermann's frequency domain-based embodiment of Figs. 2 and 3 is no different in such respects. Accordingly, it is respectfully submitted that the Office Action assertion: "Kellermann discloses area orienting the interfering, sources from the first and second signals to provide a corresponding number of interfering source signals each corresponding to a different one of the interfering sources and each including a plurality of frequency components the components each corresponding to a different frequency" is incorrect.

Independent of these grounds, further reasons supporting patentability of claim 1. For example, the Office Action turns to Elko to teach localizing as recited in claim 1 relying on several Elko passages; however, it is respectfully submitted that there is no localization of interfering sources from composite first and second signals to provide corresponding interfering source signals as defined in claim 1. Instead, Elko appears to steer a directional sound pickup pattern (see Elko's Fig. 6) based on location of a noninterfering source that is transferred an unity power, while minimizing total acoustic power overall. Elko, col. 3, line 41 - col. 4, line 17 (emphasis added). Elko also fails to provide the other features missing from Kellerman. Thus, several features of claim 1 are not taught or disclosed in the asserted Kellerman/Elko combination.

Even assuming *arguendo* that all the features are included in the asserted combination, the requisite suggestion of the desirability or other motivation to combine the references is absent. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 USPQ2d, 1783-84 (Fed. Cir. 1992) (holding that a combination of references does not render a claim obvious due to a lack of suggestion or motivation to combine or modify). As a corollary, the patent office has recognized that "[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." Manual of Patent Examining Procedure (MPEP) §2143.01. MPEP §2143.01 also states that "[i]f the proposed modification or combination of the prior art would change the principle of

operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.” Likewise, there must be some reasonable expectation of success with regard to the asserted combination (MPEP §2143.02). Moreover, the suggestion/motivation to combine or modify under §103 needs to be specific. Where a "statement is of a type that gives only general guidance and is not specific as to the particular form of the claimed invention and how to achieve it ... [s]uch a suggestion may make an approach 'obvious to try' but it does not make the invention obvious." *Ex parte Obukowicz*, 27 USPQ2d 1063, 1065 (U.S. Pat. and Trademark Off. Bd. of Pat. App. & Interferences 1993) (*citations omitted*).

The Kellermann reference focuses on improving operation when an inhomogeneous noise signal area is present. Compare Kellerman, col. 1, lines 29-32 to Kellerman, col. 2, lines 3-6. In contrast, the Elko reference focuses on steering the null points of a directional pattern in a manner that fails to take into account noise inhomogeneity. Moreover, Kellermann relies on detecting noise levels during intervals that are speech signal free, while Elko shuns "the need for delineating signal-free intervals and generating fictitious signals ..." Compare Kellerman, col. 3, lines 47-55 to Elko, col. 3, lines 17-19. These inconsistent goals and operational aspects of Kellermann relative to Elko discourage those skilled in the art from considering the asserted combination; and thus the requisite motivation is lacking. Moreover, there would be no reasonable expectation of success by attempting to do so. See, MPEP §2143.02.

In rejecting claim 1, the Office action recites the somewhat awkward terminology “area orienting” and later states "Kellermann disclose [sic] area orienting the interfering sources [citations omitted], said area orienting logically being localizing, however, Kellermann does not

specifically disclose localizing." See Office Action pp. 2-3. After careful review, the "area orienting" terminology is not recited in Kellermann nor Elko, and it is unclear what is meant by it. To the extent it is asserted to bridge the references, the absence of such terminology in either reference counsels against it. Accordingly, to the extent there is continued reliance on such terminology in rejecting the application, further explanation is respectfully requested.

Besides the lack of motivation to combine, further reasons support patentability of the other rejected independent claims. For example, the features of independent claim 9 include a localization operator to provide a plurality of interfering source signals, each representative of a corresponding one of the interfering sources, that are also each represented in terms of a plurality of frequency components. Furthermore, an extraction operator suppresses at least one of these frequency components of each of the interfering sources that is different for each of the interfering sources. The Office Action relies on Kellermann for such features, which, again fails to disclose them. For at least the reasons explained in connection with claim 1, interfering signals each representative of one of the interfering sources are not taught or suggested in Kellermann. Moreover, Kellermann lacks any teaching or suggestion of suppressing a different one of the frequency components for each of the interfering sources. Accordingly, numerous grounds also support patentability of claim 9.

In another example, the rejection of independent claim 17 asserts that "Kellermann discloses an area orienting the sources as a function of the delayed signal pairs and a number of coincidence patterns, the patterns each corresponding to one of a number of positions relative to the first and second sensors" with reference to column 3. Office Action, p. 5. After careful review, there does not appear to be any teaching or suggestion of coincidence patterns in

Kellermann or Elko -- giving such terminology its ordinary meaning in the art. As nonlimiting examples of such patterns, reference is made to Figs. 17 and 18 and accompanying text of the present application. Moreover, there does not appear to be any teaching or suggestion in either reference of coincidence patterns each corresponding to one of a number of positions relative to the sensors and establishing an expected variation of acoustic source position information with frequency that is attributable to a source at the one of the positions, as recited in claim 17.

In still another example, further grounds make independent claim 26 patentable. For instance, as explained in connection with claim 17, coincidence patterns corresponding to one of a number of positions are absent. Moreover, features of claim 26 that are not taught or suggested also include these patterns each relating frequency varying sound source position information caused by ambiguous phase multiples to the one of the positions to improve sound source localization.

In yet another example, it was asserted in rejecting independent claim 32 that Kellermann discloses "means for area orienting each of the sound sources to one of said positions as a function of said delayed signals in a corresponding one of a number of patterns of frequency invariant data corresponding to one of said positions and frequency dependent data corresponding to at least two other of said positions" again citing various passages of Kellermann. As a careful review of these passages will reveal, such features are not taught or suggested.

In a further example, the Office Action rejects independent claim 34 by contending that Kellermann discloses a provision of a time increment signal that corresponds to an "area difference" of the selected source from the noise source. As in the case of "area oriented"--"area

difference" is not further explained and is not terminology used in the references. Moreover, there appears to be no discussion of any type of difference -- let alone an "area difference" -- between a selected source and a noise source because the location of the noise sources is not determined in the Kellermann disclosure. The Office Action continues with the assertion that "area difference logically being separation, however, Kellermann does not specifically disclose time increment corresponding to separation." Again relying on Elko instead, which fails to teach or suggest a time increment corresponding to the claimed features.

A still further example arises in connection with independent claim 41. Among the features of claim 41 are: determining a member of a number of spectral signals representative of position of a second signal source where the second signal source provides an unwanted signal and further generating an output signal representative of a first signal source that provides the desired signal from this member. In other words, the member of the spectral signals representative of the position of the source of the unwanted signal (the second signal source), is representative of the spectral content of the desired signal and is used to generate the output signal. In the present application, nonlimiting embodiments of this unique phenomenon are described in connection with arrays 46 and 352 of Figs. 1-3 and 10-13, respectively. In contrast, the teachings of both Kellermann and Elko lead away from this approach.

Besides the patentability of the base claims, further reasons support patentability of the dependent claims rejected with the Kellermann/Elko combination. For example, dependent claim 4 further includes filtering (as part of localizing) with a number of coincidence patterns each corresponding to one of a number of predetermined spatial positions relative to the sensors,

and the patterns each providing phantom position information that varies with frequency relative to one of the predetermined spatial positions. In rejecting this claim, the Office Action states:

Consider claim 4, Kellermann discloses area orienting (see col. 3 lines 1-67).

Kellermann does not specifically disclose localizing. Elko teaches localizing (see col. 4 lines 18-41, col. 3 lines 40-65, col. 5 lines 60-67, col. 6 lines 1-7, and col. 5 lines 1-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Kellermann, and localize, as taught by Elko, thus allowing improved directional sound capability where noise and sources change over relatively short time periods, as discussed by Elko (col. 2 lines 2-10, and col. 1 lines 10-67).

Office Action, page 11. This passage simply fails to address many of the relevant features of claim 4 as do the cited passages. In another example, claim 8 further defines the invention of claim 5 reciting that the interfering signals are each determined from a unique pair of delayed signals as a ratio between a difference in magnitude of the unique pair of the delayed signals and a difference determined as a function of an amount of delay associated with each member of the unique pair of delayed signals.” The explanation offered on page 11 for this claim as well as the passages cited, fail to teach or suggest such features. In a further instance, claim 10 includes a filter based on a different coincidence pattern of ambiguous positional information that varies with frequency for each of the positions, which is also not taught or suggested. In dependent claim 15, the invention of claim 14 is further defined, its features including that the interfering signals each correspond to a ratio between a difference in magnitude of the unique pair of the

delayed signals and a difference determined as a function of an amount of delay associated with each member of the unique pair of the delayed signals. In the rejection, it was stated that Kellermann does not specifically disclose a ratio of the difference in propagation measurements - instead relying on Elko. The asserted "propagation measurement" does not equate to the features described in claim 15. Likewise, a review of the cited passages in support of the rejection do not reveal such features. In still another example, claim 33 includes the processor with means for adjusting the delayed signals with a head-related-transfer-function. The Office Action asserts that column 3, lines 40-65 of the Elko reference discloses these features. It is respectfully submitted that this passage is silent as to any type of head-related-transfer-function. Thus, numerous reasons support the patentability of dependent claims rejected with the Kellerman/Elko combination in addition to the patentability of the corresponding independent claims, as previously explained.

Dependent claims 12, 18-24, 30, and 35-40 were rejected under §103 as being unpatentable over Kellermann in view of Elko and further in view of U.S. Patent No. 4,536,887 to Kaneda et al (Kaneda). The Applicants respectfully traverse. As an initial matter, it should be appreciated that grounds supporting patentability of the corresponding independent claims also support patentability of these rejected dependent claims. Furthermore, additional independent reasons support patentability of rejected dependent claims.

For example, the requisite suggestion to combine Kellermann, Elko, and Kaneda is additionally discouraged by the disparagement of fictitious signals in Elko. Elko, col. 3, lines 14-21 (citing the Kaneda reference specifically). In a further example, claim 18 further defines the invention of claim 17 reciting that the coincidence patterns each correspond to a number of

relationships characterizing a variation of phantom acoustic source position with frequency where the relationships each correspond to a different ambiguous phase multiple. Such features are not the "fictitious signals" of Kaneda, nor are they taught or suggested by any of the asserted references considered individually or in combination. As to claim 19, it further defines the invention of claim 18 reciting that the relationships for each of the coincidence patterns are determined as a function of distance separating the first and second sensors. Again these features are not taught or suggested. Claim 20 further describes the invention of claim 18 stating that the relationships each correspond to a secondary contour that curves in relation to a primary contour where the primary contour represents frequency invariant acoustic source position information determined from the delay signal pair corresponding to the one of the positions. Likewise, these features are not taught or suggested by the asserted references individually or collectively.

In another example, dependent claim 21 features include that said localizing includes filtering with the coincidence patterns to enhance true position information with phantom position information, which is not taught or suggested. Claim 22 further defines claim 21 reciting that said localizing includes integrating over time and integrating over frequency, which are also absent. Thus, numerous grounds support the patentability of dependent claims rejected with the Kellermann/Elko/Kaneda combination in addition to the reasons supporting patentability of the base claims.

Dependent claim 25, 29, 42, 44, and 45 were rejected under §103 as being unpatentable over Kellermann in view of Elko and further in view of U.S. Patent 5,712,830 to Ross et al (Ross). The Applicants respectfully traverse. As an initial matter, it should be appreciated that grounds supporting the patentability of corresponding independent claims also support

patentability of there rejected dependent claims. Furthermore, additional grounds support patentability.

For example, the features of claim 25 include that the positions [relative to the first and second sensors from the base claim 17] each correspond to an azimuth established relative to the first and second sensors and further comprising generating a map showing relative location of each of the sources (emphasis added). The asserted combination of references fails to reveal generation of a map as recited in claim 25. Moreover, Ross is directed to an entirely different problem regarding ultrasound detection of objects. The only specific explanation provided in connection with Ross was that it teaches azimuth. This explanation fails to set forth, with the required degree of specificity, the rationale for combining the references in the manner asserted. Indeed, it is submitted that the requisite suggestion to combine is absent. In another example, among the features of claim 29 are the output device being configured to provide a map of acoustic source locations, which are also not taught or suggested by the asserted references collectively or individually. Thus, further grounds support patentability of these rejected dependent claims.

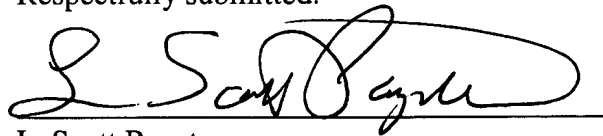
Claims 35 and 42 were rejected under §103 as being unpatentable over Kellermann in view of Elko as applied to claim 41 above and further in view of U.S. Patent No. 3,894,195 to Kryter et al (Kryter). The Office Action appears to rely on the Kryter reference as teaching a hearing aid without any specific explanation as to the source of the suggestion or motivation to combine it with the Kellermann and Elko references. Indeed, the hearing aid of Kryter includes microphones that are attached to a person to move therewith. Kryter, col. 4, lines 50-67. The Kellermann reference relies on the uncorrelated nature of noise relative to the more correlated

nature of speech to distinguish between the two. (col. 2, lines 7-12). Furthermore, Kellermann is directed to the detection of speech in a car or similar environment, where only uncorrelated noise is expected. See Kellerman, cols. 3 and 4 generally.

In contrast, many applications of hearing aids involve the desire to distinguish between different speech signals (the so-called "cocktail party effect"). See, Kryter, col. 2, lines 49-60. Such sound sources often are correlated contrary to the Kellermann assumption. Such inconsistencies would discourage those skilled in the art from combining the references in the manner asserted. Moreover, there would be no expectation of success from doing so given that Kellermann is described in a setting where microphones remain fixed relative to the speaker as contrasted to a typical hearing aid -- leading one to question whether a successful combination could result without undue experimentation and significant redesign. Thus, the motivation or suggestion to combine these references also appears to be absent.

In view of the foregoing, it is believed that claims 1-45 are in condition for allowance. Reconsideration of the present application as amended is respectfully requested. The Examiner is encouraged to contact the undersigned by telephone to resolve any outstanding matters concerning the present application.

Respectfully submitted:

A handwritten signature in dark ink, appearing to read "L. Scott Paynter", written over a horizontal line.

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